EARTH-CLOSETS:

HOW TO MAKE THEM AND HOW TO USE THEM.

BY

GEO. E. WARING, JR.,

AUTHOR OF "THE ELEMENTS OF AGRICULTURE" AND "DRAINING FOR PROFIT AND DRAINING FOR HEALTH," FORMERLY AGRICULTURAL ENGINEER OF THE CENTRAL PARK, NEW YORK.

PRICE TWENTY-FIVE CENTS.

NEW YORK:
THE TRIBUNE ASSOCIATION,
154 NASSAU STREET.
1868.

BAKER & GODWIN, PRINTERS.
No. 1 Spruce St., N. Y.

In offering this pamphlet to the public, it is not necessary to accompany it by a word of explanation or apology.

It is sufficiently understood, by all who have given the least thought to the subject, that the waste of the most vital elements of the soil's fertility, through our present practice of treating human excrement as a thing that is to be hurried into the sea, or buried in underground vaults, or in some other way put out of sight and out of reach, is full of danger to our future prosperity.

Our bodies have come out of our fertile fields; our prosperity is based on the production and the exchange of the earth's fruits; and all our industry has its foundation in arts and interests connected with or dependent on a successful agriculture.

Liebig asserts that the greatness of the Roman Empire was sapped by the *Cloaca Maxima*, through which the entire sewage of Rome was washed into the Tiber. The yearly decrease of productive power in the older grain regions of the West, and the increasing demand for manures in the Atlantic States, sufficiently prove that our own country is no exception to the rule that has established its sway over Europe.

The large class who will fail to feel the force of the agricultural reasons in favor of the reform which this pamphlet is written to uphold, will realize, more clearly than farmers will, the importance of protecting dwellings against the gravest annoyance, the most fertile source of disease, and the most certain vehicle of contagion.

Supported as they are, then, by the most imperative agricultural and sanitary considerations, it is hoped that the arguments of the following pages will commend themselves to the approval of all, in both town and country, who have the well-being of society at heart.

Ogden Farm, Newport, R. I.,
September, 1868.

THE EARTH-CLOSET.

The Earth-Closet is the invention of the Rev. Henry Moule, of Fordington Vicarage, Dorsetshire, England.

It is based on the power of clay and the decomposed organic matter found in the soil to absorb and retain all offensive odors and all fertilizing matters; and it consists, essentially, of a mechanical contrivance, (attached to the ordinary seat,) for measuring out and discharging into the vault or pan below a sufficient quantity of sifted dry earth to entirely cover the solid ordure and to absorb the urine.

The discharge of earth is effected by an ordinary pull-up similar to that used in the water-closet, or, (in the self-acting apparatus,) by the rising of the seat when the weight of the person is removed.

The vault or pan, under the seat, is so arranged that the accumulation may be removed at pleasure.

From the moment when the earth is discharged, and the evacuation is covered, all offensive exhalation entirely ceases. Under certain circumstances, there may be, at times, a slight odor as of guano mixed with earth, but this is so trifling and so local, that a Commode arranged on this plan may, without the least annoyance, be kept in use in any room.

This statement I make as the result of my own experience. I have in constant use in a room in my house an Earth-Closet Commode, and even when the pan is entirely full, with the accumulation of a week's use, visitors examining it invariably say, with some surprise, "You don't mean that this particular one has been used!"

At this point, the writing of this was interrupted for some weeks by the outbreak of typhoid fever in my family: every person sleeping on the second floor of the house being attacked with the symptoms of the fever, which happily was arrested, except in the case of one of my children, who has been very ill with a pronounced type of the disease.

My house stands on one of the healthiest sites of this healthiest of all towns, and there is nothing in the soil or in the neighborhood to which any malarious influence can be ascribed; but, standing within ten feet of the house, on the side from which the wind usually blows, there was a common deep-vault privy, which had been also a receptacle for the slops of the house. On consultation with other members of the family, the fact was recalled, that on two successive evenings a peculiarly offensive and unusual odor had filled the whole lower part of the house. I immediately caused the vault to be cleaned out and filled up with earth, and its contents to be composted with earth, the whole vicinity being covered with air-slaked lime.

Attending this disinfection there has been a rapid convalescence on the part of the whole household—equal to the effect of a removal to the mountains. I have no question that the putrefying contents of this vault were the direct cause of the disease, and that the removal of the cause led to our speedy recovery.

Having received a Commode from the Earth-Closet Company, in London, I placed it in a small room between two rooms in which fever patients were lying, and it has been the greatest possible comfort to both patients and nurses. There has been absolutely no annoyance, and the attending physician has been enthusiastic in its praise.

The experience has been a sad one, it is true, but nothing could have so thoroughly convinced me as this has of the inestimable value of the invention, and given so much zeal to my effort to make others realize as I do the necessity for its universal adoption.

HOW TO MAKE AN EARTH-CLOSET.

The principle on which the Earth-Closet is based is as free to all as is the earth itself, and any person may adopt his own method of applying it. All that is *necessary* is to have a supply of coarsely sifted sun-dried earth with which to cover the bottom of the vessel to be used, and after use to cover the deposit. A small box of earth, and a tin scoop are sufficient to prevent the gravest annoyance of the sick room. But, of course, for constant use, it is desirable to have a more convenient apparatus,—something which requires less care, and is less troublesome in many ways.

To this end, the patented invention of Mr. Moule is applicable. This comprises a tight receptacle under the seat, a reservoir for storing dry earth, and an apparatus to measure out the requisite quantity and throw it upon the deposit.

The arrangement of the mechanism is shown in Fig. 1. A hopper-shaped reservoir, made of galvanized iron, is supported by a framework at the back of the seat, which rests on the framework *a*, *a*. Connected with the handle at

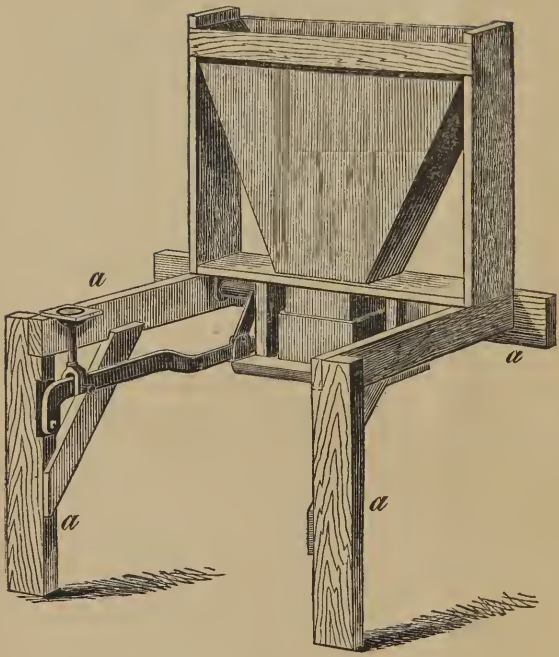

Fig. 1.

the right-hand side, there is an iron lever, which operates a movable box at the bottom of the reservoir, and causes it to discharge its contents directly under the seat. When the handle is dropped, the box returns to its position and is immediately filled preparatory to another use.

The hopper-shaped reservoir is supported by two pivots, and has a slight rocking or vibrating motion imparted to it by each lifting of the lever. This prevents the earth from becoming clogged, and insures its regular delivery.

The construction is more clearly shown in Figs. 2 and 3, the former being the "pull-up" style, and the latter the "self-acting."

THE "PULL-UP" APPARATUS.

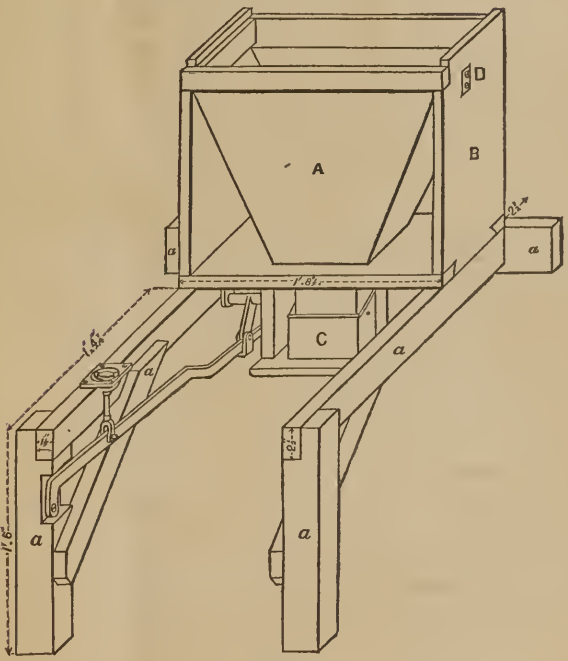

Fig. 2.

Fig. 2. A, is the vibrating hopper for holding the earth. Its capacity may be increased to any desired extent by building above it a straight-sided box of any height. It is not unusual, in fixed privies, to make this reservoir large enough

to hold a supply for several months. As the earth is dry, there is no occasion for the use of anything better than common pine boards in making this addition to the reservoir.

B, is one side of the wooden frame by which the hopper is supported, and it may be made of one-inch pine or spruce.

C, is a box of lacquered or galvanized iron, without either top or bottom. It moves on two pivots, one of which is shown on its exposed side. In its present position, its upper end opens into the hopper, and its lower end is closed by the stationary board over which it stands. When the handle is pulled up, the lever, which is connected with the box, jerks it rapidly up, so that its back side closes the opening of the reservoir, and its bottom opens to the front. In its movement it discharges its content of earth forward under the seat. When the handle is dropped, the box returns to its natural position, and is charged again.

D, is one of the pivots,—a corresponding one being on the other side,—by which the hopper is supported, and on which it vibrates.

a, *a*, *a*, *a*, *a*, *a*, are the parts of the framework, the dimensions of which in feet and inches are given.

The only essential part not shown is an earthen-ware pan without a bottom, similar to the pan of a water-closet, only not so deep and with a larger opening, which is attached to the under side of the seat and which, in a measure, prevents the rising of dust, and conducts the urine to the point at which the most earth falls. This is the least important part of the invention, but it has a certain advantage.

Fig. 3 represents the "Self-Acting" apparatus. It differs from the "Pull-Up" mainly in the natural position of the box C, and in the manner in which this is operated.

The seat is hinged at its rear edge, and its front edge is

THE "SELF-ACTING" APPARATUS.

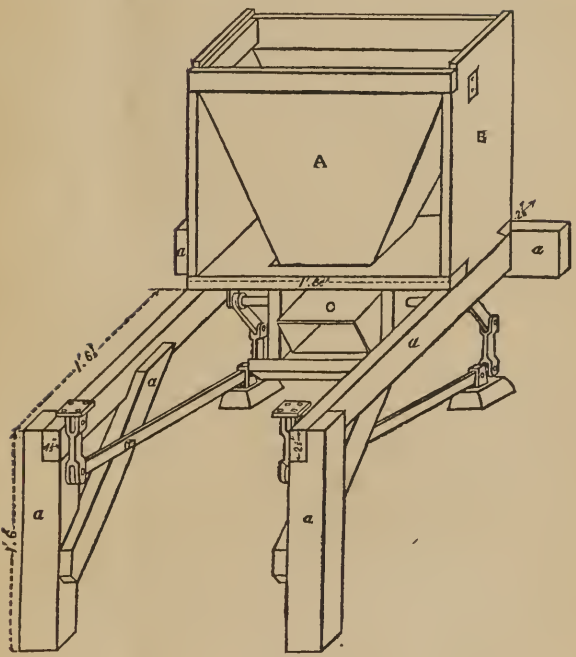

Fig. 3.

slightly raised, being supported by the two square heads at the ends of the levers,— they being held in their position by weights such as are shown in the cut. When the weight of the person is placed on the seat, it is pressed down, the weights are raised, and the box C is thrown into the same position that it occupies in the Pull-Up variety when not in use. It is then filled with earth, and, on rising quickly from the seat, the weights bring it back to its natural position, (as

shown in the cut,) with sufficient force to cause its contents to be discharged under the seat.

The "Self-Acting" Closet is best adapted for schools, prisons, hotels, and public institutions generally,— where it is to be used by irresponsible persons,— but it is not so convenient for the use of a family of ordinary intelligence as is the "Pull-Up."

THE ORDINARY PRIVY.

In the Circular published by the Earth-Closet Company, the following directions are given:

"An ordinary fixed closet requires the apparatus to be placed at the back of and in connection with the usual seat, the reservoir for containing the earth being placed above it. Under it there should be a chamber or vault about four feet by three wide, and of any convenient depth, with a paved or asphalted bottom, and the sides lined with cement. Should there be an existing cesspool, it may be altered to the above dimensions. Into this the deposit and earth fall, and may remain there three, six, or twelve months, and continue perfectly inodorous and innoxious, merely requiring to be occasionally levelled by a rake or hoe. If, however, it should be found impossible or inconvenient to have a vault underneath, a movable trough, of iron or tarred wood, on wheels, may be substituted. In this case it will be advisable to raise the seat somewhat above the floor, to allow the trough to be of sufficient size.

"By one form of construction, (the "Pull-Up,") the pulling up a handle releases a sufficient quantity of the dry earth, which is thrown into the pit or vault, covering the deposit and completely preventing all smell. By another, (the "Self-Acting,") the same effect is produced by the

action of the seat. The apparatus may be placed in and adapted to almost any existing closet or privy, and so arranged that the supply and removal of earth may be carried on inside or outside as desired.

"It is in most cases quite easy to arrange for the closet to be placed up stairs; and for the contents of the pail to be emptied down a shaft, either inside or outside the building."

The following cuts (Figs. 4, 5, 6, 7, 8, and 9) show how the apparatus may be adapted to existing privies. Of course, variations from these plans may be made as circumstances require:

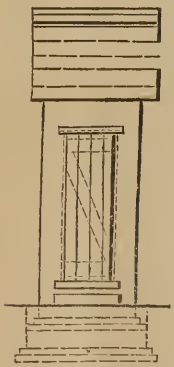

FIG. 4.—FRONT ELEVATION.

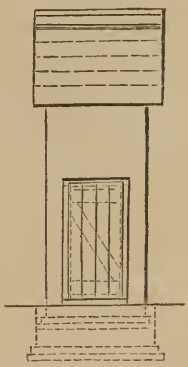

FIG. 5.—BACK ELEVATION.

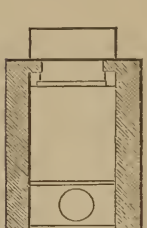

FIG. 6.—PLAN.

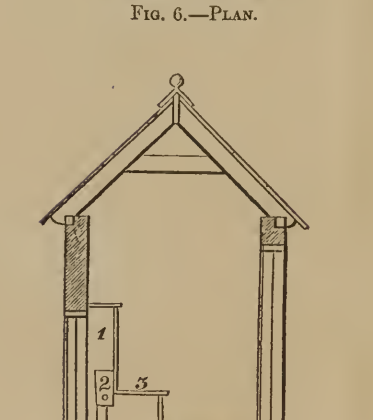

FIG. 7.—LONGITUDINAL SECTION.

1. Earth Box. 2. Hopper. 3. Seat. 4. Vault.

There is a door at the back, to enable the earth-box to be filled and the vault to be emptied. This is not necessary if it is arranged to do the work from the inside.

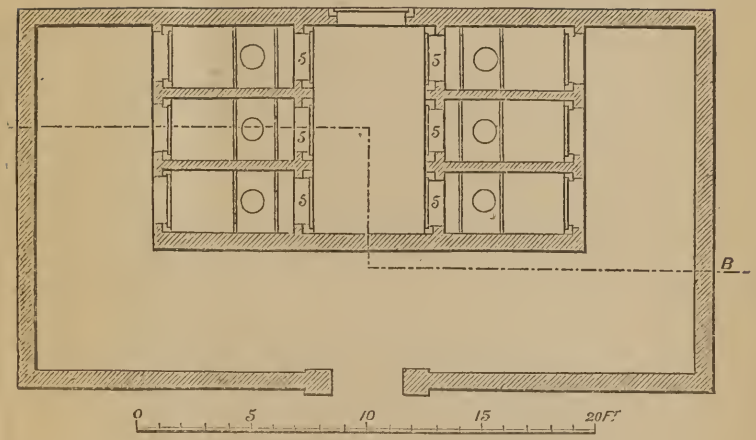

FIG. 8.—PLAN FOR CLOSETS IN A SET OF SIX—AS FOR RAILWAY STATIONS.

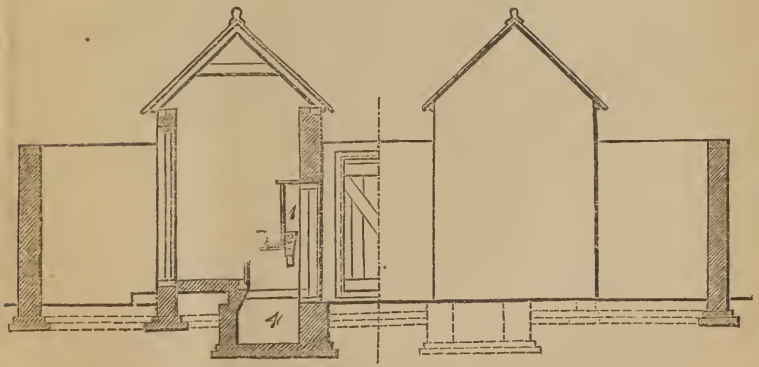

FIG. 9.—SECTION ON LINE. A. B.

COMMODES

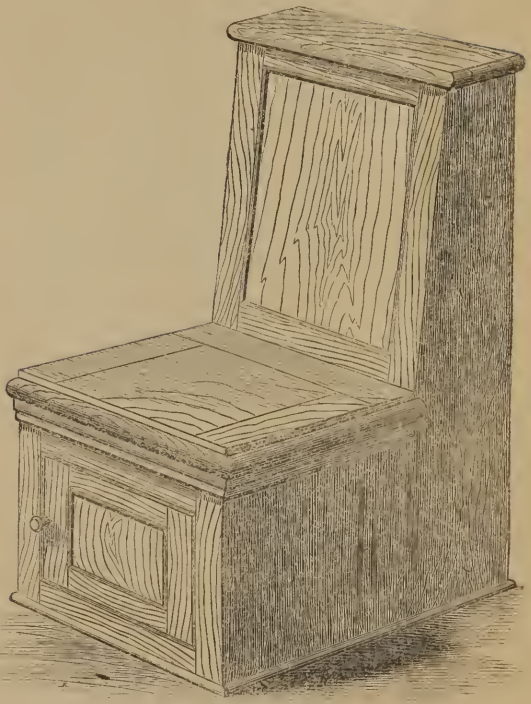

Fig. 10.—Commode, 3 ft. 3 in. High, 1 ft. 11 in. Wide, 2 ft. 2 in. Deep.

The following is taken from the Company's Circular:

"In the Commode (see Fig. 10) the apparatus and earth reservoir are self-contained, and a movable pail takes the place of the chamber or vault above described. This must be emptied as often as necessary, and the contents may be applied to the garden or field, or be allowed to accumulate in a heap under cover until wanted for use. This accumu-

lation is inodorous, and rapidly becomes dry. The Commode can stand in any convenient place in or out of doors. For use in Bedrooms, Hospital Wards, Infirmaries, &c., the Commode is invaluable. It is entirely free from those faint, depressing odors common to portable water-closets and night-stools, and through its admission one of the greatest miseries of human life, the foul smells of the sick room, and one of the most frequent means of communicating infection, may be entirely prevented. It is invariably found that if any failure takes place, it arises from the earth not being properly dry. Too much importance cannot be attached to this requirement. The Earth Commode will no more act properly without *dry* earth, than will a water-closet without water.

"These Commodes are made in a variety of patterns, from the Cottage Commode to the more expensive ones in mahogany or oak, and vary in price accordingly. They are made to act either by a handle, as in the ordinary water-closet, or self-acting, on rising from the seat. The earth-reservoir is calculated to hold enough for about twenty-five times; and where earth is scarce, or the manure required of extraordinary strength, the product may be dried as many as seven times, and without losing any of its deodorizing properties.

"If care be taken to cast one service of earth into the pail when first placed in the Commode, and to have the commonest regard to cleanliness, not the least offensive smell will be perceptible, though the receptacle remain unemptied for weeks. Care must also be taken that no liquid but that which they are intended to receive be thrown into the pails."

The pail used in the Commode is made of galvanized iron, and is shaped very much like an ordinary coal hod. It

has a cover of the same material, and it may be carried from an upper floor with no more offensiveness than a hod full of common earth.

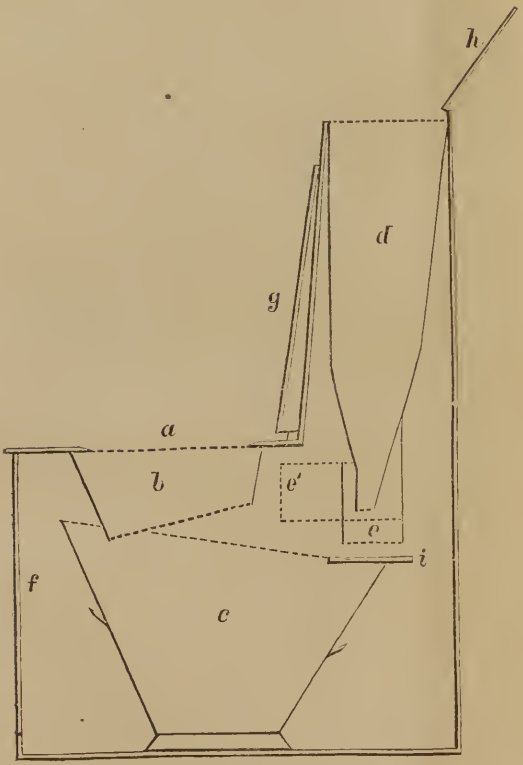

Fig. 11.

Fig. 11 represents a cross section of the Commode, and will enable the reader more clearly to understand the construction and operation of the apparatus.

a, is the opening in the seat; *b*, the "pan;" *c*, the pail for receiving the deposit; *d*, the hopper for containing the earth supply; *e*, the box by which the earth is measured, and by which it is thrown into the pail when moved to the position *e'* by the operation of the "pull-up;" *f*, a door by which the pail is shut in; *g*, the cover of the seat; *h*, the cover of the hopper; *i*, a platform which prevents the escape of earth from *e*.

THE APPARATUS.

The apparatus for the construction of Earth Privies and Commodes may be manufactured by any clever tinsmith or plumber, or they may be imported from "Moule's Patent Earth-Closet Company," 29 Bedford Street, Strand, London, Thos. M. Evans, Manager.

It is now in contemplation to form a company in this country, to manufacture the apparatus under Mr. Moule's patent.

HOW TO USE THE EARTH-CLOSET.

Under this head, the Circular issued by the London Company contains the following:

"The first requirement for the proper working of the Earth-Closet is earth perfectly dry and sifted.

"Earth alone is proved to be the best deodorizer; and far superior to any disinfectants; but where it is difficult to obtain earth abundantly, sifted ashes, as before stated, may

be mixed with it in proportion of two of earth to one of ashes.

"As the first requirement is *Dry Earth sifted*, and as this is usually thought to be a great difficulty in the way of the adoption of the Dry Earth System, the following remarks will at once remove such an impression.

"The Earth Commode and Closet, if used by Six persons daily, will require on an average about one hundred weight of earth per week. This may be dried for family use in a drawer made to fit under the kitchen range, and which may be filled with earth one morning and left until the next. The drawer should reach to within two inches of the bottom bar of the grate. A frame with a handle, covered with fine wire netting, forming a kind of shovel, should be placed on this drawer; the finer ashes will fall through, mixing with the earth, whilst the cinders will remain on the top, to be from time to time thrown on the fire. If required for a larger number, or when two or three closets are in use, the small portable dryer will be found very useful;

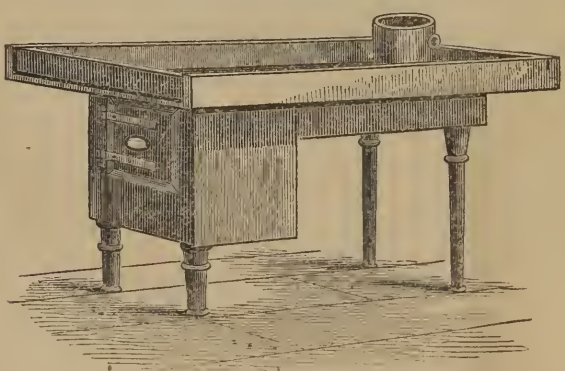

FIG. 12.—SMALL PORTABLE DRYER.

and it has the advantage of being available for any of the ordinary purposes of a hot plate.

"The consumption of earth for One Hundred people would, if used twice over, be less than a ton per week. In this case the same dryer will dry a sufficient quantity for the week, with three or four days' use. For Barracks,

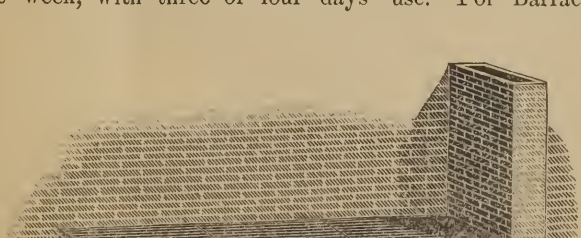

Fig. 13.—Fixed Dryer.

Unions, Mills, Infirmaries, Hospitals, Asylums, Gaols, &c., a fixed dryer, made with brick work,—a plan for building which may be had on application at the office,—is better adapted. The necessary sifting is easily effected by means of a riddle, three feet square, and similar to those used in sifting wheat; or when the consumption is small, a small sieve will be sufficient. It should always be remembered that the same earth, having been kept in a dry place for two or three weeks, may be dried and used four or five times if desired, with the same deodorizing effect, the product increasing in value. As the product is perfectly inodorous, it may be removed at any time without offence to smell or sight.

"Of course the most economical method is to provide in the summer time a winter store of dry earth, which may be kept in an out-house, shed, or other convenient place, just as we lay in a winter store of coals.

"THINGS TO BE OBSERVED.

"Let one fall of Earth be in the Pail before using.

"The Earth must be dry and sifted.

"Sand must not be used.

"No "Slops" must be thrown down.

"The Handle must be pulled up with a jerk and let fall sharply.*

"Rise from the Seat quickly.†

"APPLICATION OF THE DRY EARTH SYSTEM TO TOWNS, VILLAGES, AND OTHER LARGE COMMUNITIES.

"As in the case of Private Families, or of Larger Establishments, the first requirement is a supply of dry earth; so in the application of the Earth System to Towns or Villages, this is the first thing to be considered.

"Taking for granted that the earth will be used twice over, the quantity required for a population of 10,000 will be about thirteen tons per day. But if the earth be dried and used four times over, only half this quantity, or from six to seven tons, would be required, whilst the value of the manure is increased in like proportion.

"As the fixed dryer, figured on page 21, may be enlarged to any size there is no difficulty in providing any quantity of dried earth. It becomes simply a question of

* In the Pull-Up Variety. † In the Self-Acting.

outlay, in the first instance, for the necessary sheds and drying apparatus; and of horse and cart calculation afterwards. Just as the water-works must be adapted to the population, so must the earth-works.

"In order to introduce the system into a town, a company should be formed, which will be in fact a manure company, and which will find it to its advantage to prepare and supply the earth, and remove it at least, without any expense to the householders. For this company drying and store sheds will be requisite, and of course a staff of men with horses and carts.

"To the rate-payers the advantages presented by this system are great indeed, for not only would they be saved from the sewage rate, but from all expenses arising from broken pipes, stopped-up drains, and all their attendant discomforts."—*Circular of the London Company.*

URINALS.

There are various devices by which the use of dry earth as an absorbent and deodorizer may be adapted to public or private Urinals, rendering what is now an intolerable nuisance and a great source of waste, entirely inoffensive, and an accumulator of the most valuable manure.

For Railway Stations, Schools, Manufactories, Street Urinals, &c., the plan shown in Fig. 14 is well suited.

The vault should be large enough to hold sufficient earth to completely absorb the whole day's urine, and at night it should be changed for a fresh supply.

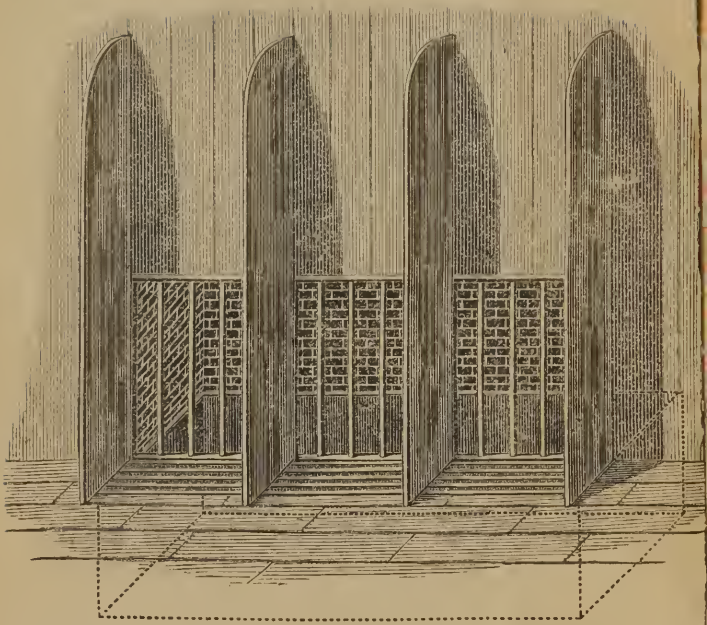

Fig. 14.

VALUE OF THE PRODUCT OF THE EARTH-CLOSET AS MANURE.

To a very large class of those by whom the Earth-Closet will be hailed as a blessing, the question of the value of the manure will have but little weight, beyond the consideration that it will enable them to have their closets attended to without cost to themselves.

On this question, however, one of the strongest arguments in favor of the adoption of the system rests.

The importance of any plan by which the excrement of our bodies may be returned to our fields, is in a measure shown in the following extract from an article that I furnished for the *American Agricultural Annual for* 1868.

"The average population of New York city,— including its temporary visitors,— is probably not less than 1,000,000. This population consumes food equivalent to at least 30,000,000 bushels of corn in a year; excepting the small proportion that is stored up in the bodies of the growing young, which is fully offset by that contained in the bodies of the dead, the constituents of the food are returned to the air by the lungs and skin, or are voided as excrement. That which goes to the air was originally taken from the air by vegetation, and will be so taken again:— here is no waste. The excrement contains all that was furnished by the mineral elements of the soil on which the food was produced.

"This all passes into the sewers and is washed into the sea. Its loss to the present generation is complete

* * * "30,000,000 bushels of corn contain, among other minerals, nearly 7,000 tons of phosphoric acid, and this amount is annually lost in the wasted night soil of New York city.*

"Practically the human excrement of the whole country

---

* Other mineral constituents of food,— important ones, too,— are washed away in even greater quantities through the same channels; but this element is the best for illustration, because its effect in manure is the most striking. Even so small a dressing as twenty pounds per acre, producing a marked effect on all cereal crops. Ammonia, too, which is so important that it is usual in England to estimate the value of manure in exact proportion to its supply of this element, is largely yielded by human excrement.

is nearly all so disposed of as to be lost to the soil. The present population of the United States is not far from 35,000,000. On the basis of the above calculation, their annual food contains 200,000 tons of phosphoric acid, being the amount contained in about 900,000 tons of bones, which, at the price of the best flour of bone, (for manure,) would be worth over $50,000,000. It would be a moderate estimate to say that the other constituents of food are of at least equal value with the other constituents of the bone, and to assume $50,000,000 as the money value of the wasted night soil of the United States.

"In another view, the importance of this waste cannot be estimated in money. Money values apply, rather, to the products of labor and to the exchange of these products. The waste of fertilizing matter reaches farther than the destruction or exchange of products: it lessens the ability to produce.

"If mill streams were failing year by year, and steam were yearly losing force, and the ability of men to labor were yearly growing less, the doom of our prosperity would not be more plainly written than if the slow but certain impoverishment of our soil were sure to continue.

* * * * "But the good time is coming, when (as now in China and Japan) men must accept the fact that the soil is not a ware-house to be plundered,— only a factory to be worked. Then they will save their raw material, instead of wasting it, and, aided by nature's wonderful laws, will weave, over and over again, the fabric by which we live and prosper. Men will build up as fast as men destroy; old matters will be reproduced in new forms, and, as the decaying forests feed the growing wood, so will all consumed food yield food again."

It would be impossible to estimate accurately the money value of a year's excrement of a full grown man. There is no well defined standard by which this can be done. But every one who has had an opportunity to observe the effect of night soil when properly used as manure, will at once agree to the proposition that any simple and inoffensive means for its preservation and adaptation to the needs of the farmer is of an importance that can hardly be over-estimated.

Concerning the value and use of the product of the Earth-Closet, the following is copied from the London Company's Circular:—(It will be noticed that reference is made to *the repeated use of same earth.* When the ordure is completely dried and decomposed, it has not only lost its odor, but it has become, like all decomposed organic matter, an excellent disinfectant, and the fifth or sixth time that the same earth is passed through the Closet it is fully as effective in destroying odors as it was when used for the first time, and of course each use adds to its value as manure, until it becomes as strong as Peruvian guano, which is now worth seventy-five dollars per ton. In fact, it may be made so rich that *one hundred pounds will be a good dressing for an acre of land.*)

"If the Closet is over a water-tight cesspool or pit, it will require emptying at the end of three or six months. The produce, which will be quite inodorous, should be thrown together in a heap, sheltered from wet, and occasionally turned over. At the end of a few weeks it will be dry and fit for use.

"If the receptacle be an iron trough or pail, the contents should be thrown together, re-dried, and used over again, four or five times. (See page 11.) In a few weeks they will be dry and fit for use; the value being increased by re-

peated action. The condition of the manure should be much the same as that of guano, and fit for drilling.

"With regard to the money value of the manures, Mr. James, of Halton, has furnished us with the following particulars. He says:

"Mr. J. Gadsden, who holds upwards of 600 acres of land in this and an adjoining parish, has applied earth passed once through the Closet to a turnip crop, and has produced some of the finest roots I ever saw, although it was sowed broadcast, and not as it should have been, by the drill. He has no hesitation at all in estimating its minimum value at £3 per ton.

"Mr. Gamble, who holds land here to the same extent, has arrived, by an independent trial and calculation, at the same conclusion.

"Mr. Henry Taylor, manufacturer of agricultural implements, at Dorchester, who is also a manure dealer, and holds a small farm, supplies the earth for the Closets and Urinals for the Dorset county school. The contents of the vault are removed by him once in three months. He has tried the manure so manufactured on various crops, and he has informed us that he considers the deposit of three months, after one use of the earth, to be worth when dry, from £2 to £3 per ton. He has tried the repeated use of the same earth, and he considers the value of the manure to increase in proportion to the number of uses.

"With regard to its practical value, the following facts may be relied on:

"To a quarter of an acre of Swede turnips, one hundred weight of earth manure, which had been used five times, was applied. To three-quarters of the same acre, superphosphate (at that time worth £7 10s. per ton) was used in

the same proportion. On the quarter of an acre dressed with earth manure, the turnips weighed one-third more than those grown on the three-quarters of an acre. The whole crop was fed off; no other manure was used; and the following year the barley crop was finer on the quarter of an acre, in the proportion of four to three.

"The following year, on another piece of land, earth which had passed seven times through an Earth-Closet, was substituted for crushed bones, at the rate of *one* hundred weight per acre. The ground was poor, the crop white turnips, and several good judges expressed the opinion that a finer crop could scarcely have been grown. Mr. Dickinson, of New Park Farm, Hampshire, has asserted that such a mixture is equal to crushed bones in power, more immediate in its action, and that the benefit lasts three years in the ground.

"In a garden near Erith, belonging to the Rev. H. Bernau, Belvedere, (about half an acre), for twelve or fourteen years an annual manuring of stable dung had failed to produce anything like a crop. Peas would not grow. Cabbages were dwarfed. Neither celery, nor rhubarb, nor parsnips, would grow at all. Last year, as an experiment, the stable dung was abandoned, and earth from a Closet used.

"The first sowing of peas was destroyed by a too liberal use. Grown wiser by experience, the gardener used less, and his barren garden was changed into a fruitful field. His peas grew seven feet high, and were covered with pods; the white heads of his cabbages weighed four pounds and upwards, and the passers-by stopped with wonder to ask what made his crops so much better than their own.

"At the West Riding prison, a piece of ground was last year sown with onions, in the usual way; the produce being

nil. This year the same ground was dressed with earth manure, and again sown with onions. Twice again dressed whilst growing, the result has been a very fine crop. At the same place, one-half of an acre of grass land was manured with rotten dung, valued at 48s. The other half acre was manured with half a ton of earth manure. The crops were both fine and equal in value.

"If the manure be not drilled in, care should be taken to use it during rainy weather; otherwise, the valuable salts contained in it remain undissolved.*

"It is believed on the ground of much observation and experiment, that as soon as the earth covers the deposit, some manurial property of that deposit begins to impregnate it; and that when the deposit is wholly absorbed, the earth has in fact digested it, or reduced it to a form or state in which it can afford nourishment to the plant. The sooner therefore, the root can reach it the better."

Further evidence of the value of the manure is contained in the testimonials at the end of this pamphlet.

MR. MOULE'S ACCOUNT OF HIS INVENTION.

In Vol. XXIV, of the Journal of the Royal Agricultural Society of England, there is a paper by Mr. Moule, entitled "Earth *versus* Water for the Removal and Utilization of Excrementitious Matter," from which the following extracts are made:

"It may be of some service, especially to the agricultural interest, if I give a brief statement of the principles on which the system of earth sewage rests, some facts and testimonies explaining and recommending the suggested mode of working it, and facts and evidence illustrative of

* This is not sound reasoning. W.

the value of the manure manufactured after the plan proposed: for, thus, I think that it may now most satisfactorily be proved that the increased demand for fertilizing agents may be largely met; the health of towns promoted by the entire removal of the sewage nuisance, instead of the present mere palliation; and the pollution of our streams and rivers prevented, the evil being no longer shifted from one quarter to another. Moreover, all this good may be secured without any of those vast and extravagant works for public drainage which add so greatly to the burdens of the country. * * * * * * * * * *

"This remedy is not restricted to towns, but is equally applicable to that great portion of our population which is scattered abroad in villages and detached houses, under circumstances which call for special consideration, since such districts often exhibit a higher rate of mortality than that of the metropolis and other first-rate towns which have hitherto almost exclusively occupied the attention of sanitary reformers. * * * * * * * *

"It was to this point (the power of earth or clay to absorb the products of the decomposition of manure), but particularly to the *repeated action*, and consequently the repeated use of the same earth, that I first directed the attention of the public. I then pointed out: 1st. That a very small portion of dry and sifted earth (1½ pints) is sufficient by covering the deposit, to prevent fermentation (which so soon sets in whenever water is used), and the consequent generation and emission of noxious gases. 2d. That if within a few hours, or even a few days, the mass that would be formed by the repeated layers of deposit, be intimately mixed by a coarse rake or spade, or by a mixer made for the purpose,

then, in five or ten minutes, neither to the eye or sense of smell is anything perceptible but so much earth. * * When about three cart-loads of sifted earth had thus been used for my family (which averaged fifteen persons) and left under a shed, I found that the material first employed was sufficiently dried to be used again. This process of alternate mixing and drying, was renewed five times, the earth still retaining its absorbent powers apparently unimpaired. Of the visitors taken to the spot, none could guess the nature of the compost, though in some cases the heap which they visited in the afternoon, had been turned over that same morning. * * * * * * *

"It is only in towns, where the delivery, stowage, and removal of earth. is attended with cost and difficulty, that any artificial aid for drying the compost would be desirable. On premises not cramped for space, the atmosphere, especially with a glass roof to the shed, will act sufficiently fast.

* * * * * * * *

"In the present stage of the working of this system the difficulty of ascertaining the value of the manure thus manufactured is very great. The variations in the earth used, and the want of exactness in observing the relative weights and proportions of the 'soil,' and of the absorbing earth, as well as in obtaining a thorough mixing of the two, combine to create this difficulty: I, therefore, prefer to give a few instances of the practical application of it to the garden and to the field, rather than to attempt to offer a scientific analysis of its composition. In planting cabbages, I have taken a handful or two of what has passed through the closets five times, and, putting it into a watering-pot, have used it in a liquid form, filling the holes in which the plants are to be set; and I have found that if this liquid manure be made too

strong it burns the root of the plant, even as guano would. A new gardener, not believing that there was much virtue in a heap of earth he found lying in a shed, thought if there was anything in it his celery plants should have enough of it. He threw over them a little more than a handful, and this burnt them up. With six pounds weight I planted in a piece of unmanured ground forty dozen broccoli and Savoy plants. No plants could be finer than they were. A cottager at Bradford Abbas commenced the system in his large cottage garden in the spring of 1862. He applied the manure to patches of mangolds and Swedes; and the land steward who persuaded him to try it, states that he never saw such fine roots as were then grown.

* * * * * * * *

"Again, in the spring of 1862, Mr. R. Hayne, of Fordington, received from me four hundred weight of earth which had passed seven times through the closet, and had afterward lain for six months in the shed. This he used at the rate of one hundred weight to an acre, instead of crushed bones, on a piece of very poor land to be sown to turnips. Both he and Mr. R. Damen, of Dorchester, a well known agriculturist, consider the crop to have been remarkably good, and that crushed bones could not have answered better as a manure.

* * * * * * * *

"The economy of the system will not depend solely, or even chiefly, on the money value of the manure manufactured, but in a great degree on dispensing with the large outlay which the water system involves.

"I will instance the national schools in a borough town which is under the water system. There are 300 boys and girls attending these schools. It has cost £70 to connect them with the sewers. It would not have cost £20

to provide them with self-acting Earth-Closets. In a country jail it costs £50 a year to keep in order the water-closets by which the manure of 150 prisoners is wasted. Apply the earth system—the repairs of which would not be £5 a year—and thus nearly £200 a year will be saved to the country. In confirmation of this opinion the intelligent master of the Kingswood reformatory, who was sent to me by the committee to inquire into the system, expressed his conviction that he would be able to make from 100 boys £200 a year, and at the same time prevent abominations in the way of offensiveness that can scarcely be told.

* * * * * * * *

"You may by means of it (the earth system) have a privy close to the house and a Closet up stairs, from neither of which shall proceed any offensive smell or any noxious gas. A projection from the back of the cottage, eight feet long and six feet wide, would be amply sufficient for this purpose. The nearer three or four feet down stairs, would be occupied by the privy, in which, by the side of the seat, would be a receptacle for dry earth. The 'soil' and earth would fall into the further five or four feet, which would form the covered and closed shed for mixing and drying. Up stairs the arrangement would be much the same, the deposit being made to fall clear of every wall. Through this Closet the removal of noxious and offensive matters, in time of sickness, and of slop-buckets, would be immediate and easy; and if the shed below be kept well supplied with earth, all effluvium would be almost immediately checked. As to the trouble which this will cause, a very little experience will convince the cottager that it is less instead of greater than

the women generally go through at present, while the value of the manure will afford an inducement to exertion.

* * * * * * * *

"The truth is, that the machinery is more simple, much less expensive, and far less liable to injury than that of the water-closet. The supply of earth to the house, is as easy as that of coals. To the Closet it may be supplied more easily than water is supplied by a forcing-pump, and to the Commode it can be conveyed just as coal is carried to the chamber. After use, it can be removed in either case by the bucket or box placed under the seat, or from the fixed reservoir, with less offence than that of the ordinary slop-bucket, — indeed, (I speak after four years experience), with as little offence as is found in the removal of coal ashes. So that, while servants and others will shrink from novelty and at first imagine difficulties, yet many, to my knowledge, would now vastly prefer the daily removal of the bucket or the soil to either the daily working of a forcing-pump or to being called upon once a year, or once in three years, to assist in emptying a vault or cesspool

* * * * * * * *

"In conclusion, I would remark, that let one-fifth of the population of Great Britain adopt and thoroughly carry out this system, and one million tons of manure, equal to guano, will every year be added to our supply of fertilizers."

In a letter to the London *Builder*, of April 4, 1868, Mr. Moule says:—

"Some of my first and most trying experiments were on the horrible refuse of a slaughter house. The butcher from whom I obtained it, has told me that by what I taught him I saved him more than ten shillings a week,— such, at least, he reckons the value of this stuff mixed with a load of

earth. In the case both of the slaughter house and the knacker's yard, the refuse mixed with earth should be removed to a large fowl yard. For hospitals the system appears to me to be in every respect unexceptionable and perfect. Stables may be cleansed by the same means.

* * * * * * * *

"The value (of night soil) must be affected both by the necessity for its removal and by the offensiveness of the operation. The earth, after it has absorbed the excretions, is so perfectly inoffensive, that I have known some that had been mechanically mixed taken the same day to London in a box in his carpet bag, by a chemist; and by two engineers' clerks, it was taken, wrapped in brown paper, in their side pockets.

"The difficulties in the disposal of night soil afford no illustration, then, of the removal of mixed earth. To any one who knows those iron troughs at Aldershott, it can be no wonder that the War Office has to pay £500 or £600 a year for the removal of the contents, besides a vast sum for disinfectants. The wonder to me is, that when they could not only annihilate all smell, but with the manure saved turn scores of acres of that sandy desert into a rich sward, they can hesitate to change the system. Our barracks generally, and our public schools of every description, are, in their uncleanliness and the indecency of their latrines, a disgrace to civilized society."

TESTIMONIALS.

The following are some of the testimonials of the practicability and efficiency of the Earth-Closet, and of the value of its product as a manure:

But first let me call attention to the fact that all animals of the feline race,—whose excrement is especially offensive,—always turn and very carefully cover their droppings with earth; and to the following evidence of the antiquity of the practice of disinfecting human manure by the aid of common soil.

In Deuteronomy, chap. xxiii, 12 and 13, we read:

"*Thou shalt have a place also without the camp, whither thou shalt go forth abroad; and thou shalt have a paddle upon thy weapon; and it shall be when thou wilt ease thyself abroad, thou shalt dig therewith, and shalt turn back and cover that which cometh from thee.*"

Extract from a Letter addressed to the Rev. H. Moule, from the India Office in London, dated September 25, 1867.

"I am directed by Sir Stafford Northcote to forward for your information copies of Reports which have now been received from the Government of India, on the successful and general adoption of your dry earth sewage system in India. In consideration of the very satisfactory character of these Reports, and on the recommendation of the Gov-

ernment of India, the Secretary of State for India in Council has much pleasure in authorizing the payment to you of the sum of £500."

11, Craven Hill Gardens, Oct. 18, 1867.

To the Editor of the "Standard."

Sir: In an article on Mr. Moule's dry earth system of sewage, in your paper of to-day, you say that in England "the thing has not been tried on any scale." It has been tried, and the trial has been attended with success. In the villages of Halton, Buckland, Weston Turville, and Aston Clinton, on Baron Rothschild's estate in Buckinghamshire, with a population of about 800 persons, the system has been in use for eighteen months. The overflowing and fever-breeding cesspools, ditches, and privies, have been cleared, and not a foul smell can anywhere now be found. Through the courtesy of Mr. James, I, this summer, examined the working of the system at Halton. The mechanism of the Closet worked simply and effectually, the dry earth falling on the soil, and completely and immediately deodorizing it: the only smell to be perceived being that of damp earth. I was shown about twenty tons of earth in one shed, that had been through the Closets four times, and it was intended to pass it through four times more, when it would become a most valuable manure. The paper mixed with the earth was all completely destroyed. A man and a boy, with a horse and cart, were sufficient to attend to this population of 800. Dry earth, when used in the sick room, immediately deodorizes the excretions and prevents all unpleasantness.

Mr Moule's system is the only one that is adapted to remove sewage and fever from the small towns and villages of the kingdom. And in the larger towns, or even in London,

there is no reason why it could not be adopted. Every possessor of a cellar could take in sufficient dry earth to last for months. If the demand arose, the supply of dry earth would soon be at hand, and manure merchants would be ready to remove the soil at stated intervals,— once a month or oftener, according to the size of the receptacle.

J. BRENDON CURGENVEN.

To the Editor of the "Standard."

SIR: As the dry earth system of sewage has now been in operation in this village for more than eight months, I feel qualified to speak to the undoubted advantages both to health and purse to be gained by its adoption. Thirty-four Closets and Commodes have been in constant use for the time I have named, and not the least difficulty in supplying the dried earth and removing the excreta has been experienced. From the common objection to the adoption of anything new we have been compelled in many instances to use Commodes, and have, therefore, not had the same facility of access as will be found at Halton, where the privies have been converted into Closets. Yet at Crawley we have not had one complaint of inconvenience from the occupiers of houses where the machines have been in use. We could place as many more conveniences had we the means of procuring them, as their good reputation has been completely established here. Our method of drying the earth is so easy and simple, as are our own arrangements for distribution and collection, that I am satisfied no difficulty would be found in applying the dry earth system of sewage to towns and villages; though, as the cost of application would be so trifling in comparison to that of any other method, I am

afraid it will find for some time to come, strong opponents in local surveyors and engineers.

To any one interested in this great sanitary improvement, and who cares to make personal investigation, I shall be most happy to show the drying shed, the inodorous accumulation of many months, and both Commodes and Closets in action, as well as to give what information I can on the general advantages of the dry earth system.

FREDERICK RUSSELL.

Crawley, Oct. 27, 1867.

West Riding Prison, Wakefield, Feb. 4, 1867.

Six months having expired since the Visiting Justices of this prison granted authority for bringing "Moule's Earth-Closets" into use, I have great pleasure in bearing testimony to the value of the earth system. We have 800 cells without water-closets, and we are about placing Earth-Closets in them. We have now 100 of the latter in use. I have not had a single complaint from either warders or prisoners since we commenced using the Earth-Closets. The Earth-Closet cells are without the smell that commonly exists in the water-closet cells.

The supply of dry earth is given weekly, or when required, the Closet containing at the back (with care) a sufficient supply for fourteen days; however, to be quite secure, the pans are emptied, and a fresh supply of earth given once a week without the slightest smell in the building during the time of removal.

We have taken the precaution to make the Earth-Closets self-acting; this leaves nothing to be done by the prisoners that can disarrange the apparatus. We have established a small kiln for drying the earth, and can always keep up a

good supply. The earth, after being used in the Closets, is turned over, and pulverized once a week during the first three weeks, when it is quite fit for the farmer or gardener. No smell arises from working the soil, and in time I anticipate a profitable return for the first outlay. I shall during the coming year be enabled to observe the effect of the manure on the crops grown within the prison.

Where the Closets are in use, we have been able to do without the deodorizing powder used formerly, and during the late hard frosts we were obliged to place the Earth-Closets in cells already supplied with water-closets, the pipes being frozen. Our plumber is much in favor of the Earth-Closets; he strongly recommends that in future they should be placed in all parts of the prison in lieu of the water-closets. (An opinion certainly against his own interests.)

G. ARMYTAGE, Captain, Governor.

September 20, 1866.

At this critical time, when we are in momentary danger of outbreaks of cholera at our doors, I thought it desirable not to lose a moment in accepting the challenge offered by Mr. James in his letter in the "*Times*" of yesterday, and I rode across the hills to Halton this morning for the purpose of investigating the truth of the assertion he had made.

I inspected the earth sheds and saw the process in every stage. I put my nostrils in close contact with soil which had been taken from the Closets this morning, and I took up some which had been out no more than a fortnight without soiling my hands; and lastly, I have come away with a small parcel of the dried soil in my pocket, having during the whole investigation met with nothing in the smallest degree disagreeable. I have no hesitation in saying that

any gentleman who follows the example of Baron Rothschild in adapting this process to cottages will confer the greatest possible boon upon the poor, and I shall myself have no hesitation in recommending not only the process itself, but the little machine invented by Mr. Moule, to any one seeking my advice.

In small towns, at least, it must be of easy and inexpensive application, while the benefit to health will be great indeed.

GEO. FAITHORN,
Medical Officer of the Chesham District
of the Amersham Union.

Extract from Report by Dr. Mouat, Inspector-General of Gaols in India.

It is, in my humble judgment, impossible to over-estimate the benefits that will result from the labors of the Rev. Mr. Moule in this important branch of hygiene—the dry earth system. It is without exception the greatest public benefit conferred by a private individual in a matter so essential to public health, that I am acquainted with.

WYKE HOUSE, NEAR WEYMOUTH, Feb. 12, 1867.

Mr. Moule having requested me to send you my opinion of the Patent Earth-Closet invented by him, I can safely say that it is a great improvement upon the old plan of out-of-door vaults, and in-door water-closets, there being no smell, no derangement of water pipes by frost, &c., and, moreover, the Earth-Closet furnishes the best manure of the garden.

I lately used one of the Portable Earth Commodes for a sick room. It was there for a week, in repeated daily use, and not emptied till the end of the week; there was no

smell during all the time. I so entirely approve of the plan, that I am now having the out-of-door places altered into Earth-Closets for my pupils. You can make what use you like of this note. J. W. NEAT.

HITCHIN, March 19, 1866.

GENTLEMEN:—Your Earth-Closets have been in use for two years in the sick wards at the Hitchin Union house. As medical officer at that establishment, I can speak with the greatest confidence of the vast convenience and comfort they have been to the inmates—indeed, to all connected with the institution—as, since their introduction, the annoyance and evil of disgusting effluvia attendant upon the use of the old-fashioned Commodes have been avoided. The prejudice in the minds of many, not only among the poor, but the more educated, at the introduction of anything new is patent to most; but I feel sure that any attempt to return to the old Commode would create great dissatisfaction amongst the occupants of our sick wards.

OSWALD FOSTER, Surgeon

BURLESTON RECTORY, DORCHESTER, Jan. 29, 1866.

GENTLEMEN: Some months ago, having constant trouble with my water-closet, which was very much out of repair, I determined to make a trial of the dry earth system in its place. I have now in constant use one of your *self-acting* Earth-Closets, and my purpose in writing is to express my perfect satisfaction with it in every respect. It occupies the place of the old closet up stairs, the soil falling into an enclosed space beneath, about five feet square, reaching to the ground floor, and with a small door opening into the yard, from whence, about once a month, it is removed without the least

offence. The trouble of carrying the dry earth up stairs, I consider to be about equal to the pumping water into the cistern under the old plan. I have used the same earth four or five times without the least inconvenience, and have now a quantity of valuable manure for my garden. I do not think we can estimate the immense advantage a general application of this system would prove, not only in our towns and cities. but in the country at large.

HENRY B. MILES.

February 11, 1867.

Having been requested to give my opinion as to the working of the Patent Earth-Closets which have been in use for the last fifteen months in the county school, I beg leave to state the following particulars.

We resolved to try the Earth-Closets in consequence of the water-closets getting continually out of order. As a matter of course, offensive smells as often arose, and we had reason to believe that a severe sickness which befell us was mainly to be attributed to this fact. I am thankful to state that since the introduction of these Earth-Closets we have been free from both offensive smells and sickness. One very great advantage in them is, that it is hardly possible for them to get out of repair; at any rate ours have cost us nothing as yet, nor are they likely to do so, whilst on the other hand, under the old system, the cost for repairs for two years amounted to more than £4.

It is, perhaps, well to add that there is nothing offensive to the sight or the smell in the removal of the earth from the premises. On one occasion, when some quantity was being removed in open day, three medical men of this town gave testimony that they could discover nothing offensive.

R. G. WATSON, M. A.

To the Editor of the "Standard."

Sir: I am glad you think the discussion of the Earth-Closet system of sufficient public importance to occupy a portion of your columns. As I have adopted that system on a somewhat large scale for a private establishment, perhaps you will permit me to say I am quite satisfied with the result. And here I will remark, that only those who have been connected with schools are aware how foul and overpowering is the stench which pervades the ordinary closets which children use at schools. I am a schoolmaster, and twelve months ago I was hardly able to enter the closets which my pupils used. An unsparing use of disinfectants only mitigated the evil. Fortunately, I heard of the Earth-Closets; I at once erected four, all communicating with a concrete pit, and this pit is emptied by a boy once a week. My first outlay was inconsiderable, and what was a dangerous nuisance is now a source of profit. I procure dry earth without difficulty; in fact, the ashes from the fire-grates are almost enough to supply my want; and although they are not so good as earth, because they cause a little dust in the Closets, I find them very good as a disinfectant. I have no disagreeable smell in the Closets, which are used by twenty-six pupils and several adults. Managers of schools who are troubled with low fevers, &c., and who wish to change the expense attending the ordinary closets into a source of profit, will, I think, if they adopt Mr. Moule's plan, agree with me that schoolmasters owe to him a debt of gratitude.

I remain, &c.,

ALFRED CONDER, M. A.

Middleton Lodge, Bognor, Oct. 31.